IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application No.	: 10/518,241	Confirmation No.	: 8336
First Named Inventor	: Roger P. DUFFY		
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TC/A.U.	: 1794		
Examiner	: W. Watkins III		
Docket No.	: 038665.55712US		
Customer No.	: 23911		
Title	: Improvements Relating to Composite Curing		

APPEAL BRIEF

Mail Stop Appeal Brief- Patents
Commissioner for Patents
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Sir:

On June 17, 2009, Appellants appealed to the Board of Patent Appeals from the final rejection of claims 1, 4-9, 11-14 and 17-21. A Pre-Appeal Brief Conference Request for Review was filed on June 17, 2009, and a Notice of Panel Decision from the Pre-Appeal Brief Review was mailed on June 29, 2009. The following is Appellants' Appeal Brief submitted pursuant to 37 C.F.R. § 1.192.

I. REAL PARTY IN INTEREST

An assignment of the present application to BAE Systems PLC was recorded on June 29, 2006 at Reel/Frame 018049/0296.

II. RELATED APPEALS AND INTERFERENCES

None.

III. STATUS OF CLAIMS

Claims 2, 3, 10, 15 and 16 have been canceled.

Claims 1, 4-9, 11-14 and 17-21 are finally rejected.

Claims 1, 4-9, 11-14 and 17-21 are being appealed herein, no claims having been allowed.

IV. STATUS OF AMENDMENTS

None.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Claim 1 is directed to a breather sheet designated generally by the numeral 7 in Figs. 1 and 2. The sheet 7 has two distinct outer layers 13, 15 of semi-rigid material (e.g., carbon fiber or glass fiber) with a mesh layer 19 interposed between the outer layers. (Specification, page 5, lines 5-11). The mesh layer 19 is incompressible in a direction perpendicular to its so that the assembled breather sheet is also incompressible (Specification, page 6, lines 5-9). The outer layers 13, 15 are each provided with holes 17 prior to assembly of the breather sheet (Specification, page 5, lines 5-9). The holes 17 are so arranged that in the assembled breather sheet, passageways are formed to allow air and/or

volatiles to pass through the breather sheet 7 (Specification, page 5, lines 15-18 and 22-26). Regardless of how the mesh layer 19 is positioned, these passageways 17 are sized and configured to prevent their substantial obstruction, i.e. there is no substantial obstruction of all the passageways (Specification, page 5, lines 15-17 and 21-25). As a result of this construction, porosity of the breather sheet is assured, and the application of continuous pressure is allowed without wrinkling to provide a high quality finish. Furthermore, the sheet can be reused (Specification, page 2, lines 23-28).

Claim 7 is directed to a method of assembling the above-described breather sheet 7 with semi-rigid outer layers 13, 15, an intermediate mesh layer 19 and passageways 17 formed prior to assembly. The mesh layer 19 is, as seen in Figs. 2 and 3, interposed between the aligned outer layers 13, 15 (Specification, page 5, lines 11-14). The aligned outer layers 13, 15 with the interposed mesh layer 19 are then fixed together (e.g., adhesive bonding) to form the unitary breather sheet 7 (Specification, page 5, lines 19-21 and Fig. 3).

Claim 14 is directed to the method of using the above-described breather sheet 7 which begins with the individual prepegs forming an uncured laminate 3 see in Fig. 1, a vacuum bag 9 (e.g., a nylon membrane) covers the laminate 3 against which a release film 5 is placed as a barrier between the laminate 3 and the breather sheet 7 between the vacuum bag 9 and the release film 5 (Specification, page 4, lines 19-29). That breather sheet 7 as claimed in Claim 14 is the breather sheet described above with regard to Claim 1.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1. Whether claims 1, 4-9, 11-14 and 17-21 are unpatentable under 35 U.S.C. § 103(b) over Kromrey (U.S. 4,983,341) in view of Cole et al (U.S. 4,325,899) further in view of Muir et al (U.S. 2002/0124945 A1).

VII. ARGUMENT

A. The Rejection of Article Claim 1 Based on the Three-Reference Combination

Even in the expanded space given to the Patent and Trademark Office in applying the several tests of obviousness to one of ordinary skill in the art set forth in *KSR Int'l v. Teleflex, Inc.*, 550 US 398 (2007), the rejection of Claim 1 based on the combined teachings of the Kromrey et al patent, the Cole et al patent and the Muir et al patent publication is not sustainable. First and foremost, the rejection is based on impermissible hindsight.

The final rejection is premised solely on the teaching, suggestion, motivation test that *KSR* made clear was not the sole test. The Examiner makes no showing or contention that the combination of the three references would have occurred by any known need or problem, or that there was a design need or market pressure to solve a problem with only the availability a finite number of identified, predictable solution, or that only common sense was involved. An affirmance of the rejection requires adoption of the logic that the combination of the three references flows from the teachings, motivations or

suggestion found in them. The record in this case does not support any other theory or approach.

Before discussing the references themselves, other flaws in the final rejection bear noting. Rather than establish a factual predicate in the context of the invention under examination, the final rejection merely concludes that the "[l]ocation of the holes so as not to be blocked by the mesh member would have been an obvious matter as well as location of any adhesive so as not to block the perforations in order to promote the desired venting function." Asserting such things does not establish their existence under any standard, let alone a substantial evidence standard.

Likewise, the assertion that the substitution of the Cole et al mesh layer 26 for the Kromrey glass bead layer (the final rejection does not specify if it is referring to the small bead layer 110 or the larger bead layer 113) would have been obvious on grounds that the respective layer in each patent "serves a similar function of allowing cross ventilation when the laminate is compressed in the mold" suffers from the absence of any teaching in either patent with regard to that functionality. That is, nothing in the use of the breather sheet in the Kromrey patent hints at cross ventilation. Although the wire mesh screen 26 used in the Cole et al method is intended to allow gases produced in the forming process to travel along the wire screen, that screen remains with the lower platen and is not part of the hardband product resulting from the forming process.

The final rejection also asserts that one of ordinary skill would have "perforated the outer fiber layers [not identified specifically but presumably layers 105 and 119] of Kromrey in view of Cole et al [sic, Muir et al] to increase the venting flow normal to the plane of the sheet because of the teachings of Muir et al to increase the vapor flows through a layer in a mold by perforation of the layer." At page 2 of the final rejection, Muir et al is characterized as teaching the use of perforations [presumably mciroperforations 140] in a mold layer [presumably label 101] to allow increased venting through a layer to reduce blisters in a molded laminate. As is readily seen from even a cursory inspection of the Muir et al patent publication, the subject matter referred to is the production of a plastic molded container with an embedded label having microperforations to prevent blistering during blow molding of the container. That subject matter has nothing whatever to do with a breather sheet used in curing composite parts. Only the most abstract characterization of the teachings of the Muir et al reference, with the benefit of impermissible hindsight, permits the final rejection to find some relevance to the claimed invention herein.

The final rejection asserts that a semi-rigid layer is found in the Kromrey patent and that the layer 107 is of #1581 breather material which is 0.2 - 0.6 mm (0.009-0.027 inches) thick (the cited but not applied Seal et al patent discloses #1581 material that is 0.008-0.012 inches thick). There is no suggestion in either patent, however, that the material has any rigidity. Indeed, Kromrey's breather structure is described at col. 2, lines 52-58 to be non-supporting" and "flexible".

It is self-evident that the layer 107 of Kromrey must be highly flexible because the #1581 material is just a woven or non-woven fabric which left to its own devices will sag or drape. The mere fact that the material is made of glass fiber does not of necessity make it semi-rigid, and semi-rigidity cannot be implied.

The Kromrey patent is addressed to the goal of solving the common problem of composites that allow vapor and fluid flow but does not teach the claimed invention. The Kromrey method is concerned with the manufacture of precision molded products from composite materials as used, for example, in this aerospace industry so as to have good surface finish. The final rejection must rely upon two additional patents in an effort to bridge the differences between Kromrey's molding method where it would make no sense to place holes in the product in order to vent gases and the claimed invention herein which specifies that the breather sheet has outer layers of a semi-rigid material and is configured to allow volatiles to pass through the sheet from one outer layer to the other.

The Kromrey breather sheet comprises the flexible fabric layer 107, a layer of small beads 110, at least one layer of larger beads 113 and a layer of glass fiber 119 on the outer surface of the layer(s) of larger beads. The function of the fabric layer 107 and the layer of small beads 110 is to present a relatively smooth surface to the prepeg to be molded so that its surface is not embossed by the larger beads during molding. There is not just a single layer of beads.

Indeed, at least two layers of beads are fundamental to Kromrey's teachings as claim 1 in the Kromrey patent makes clear.

Nor would it have been obvious to substitute Cole et al's metal mesh layer for Kromrey's glass bead layer. Consider that the Cole et al method focuses on molding of hardboard and other formable boards, these being materials for the building and construction industries. A characteristic of such boards is that only one of the two surfaces of the board need to have a good standard finish. The finish of the other surface, which is not seen in normal use, is unimportant and it thus can be heavily embossed during the forming process without detriment to the acceptability of the product; Cole et al (col. 5, lines 42-46) teaches that the requirement is simply that the rear of the board is not embossed so heavily that the markings show through on to the front of the board. Because the Cole et al method is unconcerned about the rear surface of the board, given that it is making a building industry product, materials familiar to the building industry are used, specifically screens (meshes) "varying in size from standard aluminum window screen to half-inch galvanized hardware cloth".

Cole et al's mesh is the totality of their solution to the problem of ventilating gases from a hardboard-forming process. The bead layers and cover layers of the Kromrey method are the totality of his solution to a gas-ventilation problem in a different field which has widely different requirements, namely, the need for a much higher standard of finish and, in particular, the need to avoid marking the product. These requirements are lacking in Cole et al's process

which is relatively crude and operates at dimensional tolerances orders of magnitude greater than those that Kromrey must achieve. One skilled in the art would not have examined Kromrey's breather structure in detail and asked herself whether or how Cole et al's mesh could be imported into it, particularly as Cole et al admit that their process marks the product.

If one skilled in the art were for some illogical reason to have contemplated putting Cole et al's mesh into Kromrey's breather structure, the teachings of Kromrey, where the bead layers are considered essential, would had to have been disregarded. The use of a mesh instead of the beads leads to product marking. One of ordinary skill would have recognized that the thin and flexible layer 107 of Kromrey would also not resist the relatively widely-spaced and locally-concentrated forces that would be applied to the product by the mesh. And, as noted above, there is no teaching of semi-rigid outer layers of Kromrey. Both layers 107, 119 are clearly flexible; indeed, layer 119 is specifically described at col. 4, line 16 as "compliant".

Assuming one of ordinary skill in the art had had the benefit of hindsight to combine aspects of Cole et al's method with that of Kromrey, she would only have contemplated replacing the entire Kromrey breather structure 107, 110, 113, 119 with Cole et al's single layer of mesh 26. The result would be a useless heavily-marked product which would destroy Kromrey's objectives. Even if that skilled person replaced only the bead layers 100, 113 of Kromrey by Cole et al's

mesh 26, the resulting thin layer 107 would be unworkable because it would not prevent the mesh marking the product surface.

That hypothetical combination certainly would not produce the claimed invention in which the volatiles are permitted to escape by passing through the sheet from one outer layer to the other, i.e. through the thickness of the sheet. In both Kromrey and Cole et al, the breather sheet is configured so that the main or only flow of volatiles is laterally within the sheet to its edges. The flow through the thickness of Kromrey's breather structure proceeds only as far as the large beads 113 and is then diverted laterally (col. 4, lines 8-14).

In both Kromrey and Cole et al, the passage of air and volatiles is primarily (and thus "freely") directed laterally of the breather structure. Any flow is through the thickness of the structure is incidental. Adding Muir et al to the Kromrey/Cole et al hypothetical combination would not have remedied this deficiency. In Muir et al, the volatiles-generating structure is embedded in the product and lateral discharge of these volatiles is impossible as a practical matter given that the label is embedded within the container material.

The Muir et al patent merely discloses a perforated embedded label for a blow-molded container, and this label is not a breather sheet for use in molding a product. To the contrary, it is part of the product itself. This reference does not teach putting holes in a breather layer. Thus, one skilled in the art of breather sheets, i.e. Kromrey's field, would not have considered Muir et al's teachings at all. As noted above, Kromrey and Cole et al direct escaping volatiles laterally of

the breather structure, rather than through its thickness. Muir et al is totally irrelevant, and certainly does not teach the use of two perforated outer layers, as it uses only one. And there is also no teaching whatsoever of how the holes should be positioned relative to internal passages in the breather structure.

For the foregoing reasons and accepting the multiple tests for determining obviousness under *KSR*, the final rejection fails to set forth a *prima facie* case of obviousness based on substantial record evidence.

B. The Rejection of Assembly Method Claim 7 Based on the Three-Reference Combination

Applicant has more difficulty in addressing this rejection as well as the one in the following section C because the final rejection says nothing specifically about them. To the extent that the Examiner has relied on some rationale that was employed in connection with article Claim 1, then Applicant incorporates herein by reference the above remarks in Section A.

The final rejection fails to set forth a *prima facie* case of obviousness to explain why one skilled in the art would have been led to a method of assembling a breather sheet by starting with the multiple glass bead layers used in Kromrey by interposing a mesh layer between those glass bead layers with holes provided prior to assembly. In fact, however, the final rejection fails to speak to Claim 7 at all.

C. The Rejection of Use Claim 14 Based on the Three-Reference Combination

Here too the final rejection is silent. Only the Kromrey patent is directed to a method of using breather materials so that fluids can be removed from articles during molding. It would be, however, antithetical to the principles of *KSR* to suggest that one skilled in the art would have looked to the Cole et al hardboard-heating forming method (sans breather material) and the Muir et al molded plastic container method (also sans breather material) to somehow modify the non-analogous Kromrey molding method that uses breather material as its essence.

And the final rejection says nothing whatsoever about the use of a breather sheet in connection with producing a cured laminate which starts with uncured individual prepegs, and interposes the above-described breather sheet (Section A) between a vacuum bag and a release film. A *prima facie* case of obviousness is clearly not established as regards Claim 14 and Claims 17, 18, 19, 20 and 21 dependent thereupon.

VIII. CONCLUSION

In view of the foregoing, Appellant respectfully submits that a *prima facie* case of obviousness of Claims 1, 4-9, 11-14 and 17-21 has not been established, and accordingly, those claims are patentable over the art of record. Reversal of the final rejection is therefore warranted.

The Appeal Brief is being submitted with the required fee of $540.00. This amount is believed to be correct, however, the Commissioner is hereby authorized to charge any deficiency, or credit any overpayment, to Deposit Account No. **05-1323**, Docket No.: 038665.55712US.

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CLAIMS APPENDIX

1. A breather sheet for use in the curing of a composite part comprising two distinct, affixed outer layers of semi-rigid material with a mesh layer interposed therebetween and incompressible across a plane of its surface such that the breather sheet as assembled is incompressible, each of the outer layers being provided with a plurality of holes prior to assembly of the breather sheet, the holes being configured and disposed such that when the two outer layers are fixed together to form the breather sheet a plurality of passageways is formed for air and/or volatiles to pass freely through the breather sheet from one outer layer to the other, the passageways being configured and disposed such that that the interposition of the mesh layer in any position or orientation relative to the outer layers does not substantially obstruct all of the passageways.

4. A breather sheet as claimed in Claim 1, wherein the outer layers and mesh layer are bonded together with adhesive.

5. A breather sheet as claimed in Claim 1, wherein at least a portion of the circumference of the breather sheet is adapted to abut another breather sheet in such a way that adjacent breather sheets can be used to form a composite breather pack.

6. A breather sheet as claimed in Claim 1, wherein the breather sheet is pre-formed to the required shape for the composite component.

7. A method of assembly of a breather sheet comprising two outer layers and a mesh layer such that the assembled breather sheet has a plurality of passageways therethrough for the free passage of air and/or volatiles from one outer layer to the other, comprising interposing a mesh layer between two outer layers, each of which outer layer is of semi-rigid material and is provided with a plurality of holes prior to assembly, aligning the two outer layers and the mesh layer, and fixing the layers together to form a unitary breather sheet.

8. A method according to Claim 7 comprising bonding the two outer layers together with the mesh sandwiched there between.

9. A method according to Claim 7, comprising shaping the two outer layers to form a breather sheet of a predetermined shape.

11. A breather sheet as claimed in Claim 1, wherein the holes of one of the outer layers are arranged differently from the holes in the other of the outer layers.

12. A breather sheet as claimed in Claim 4, wherein the adhesive is provided at spaced local spots so as to substantially avoid blocking the passageways.

13. A method according to Claim 7, wherein the step of providing each of the outer layers with a plurality of holes includes arranging the holes of one of the layers differently from the holes in the other of the layers.

14. Method of using a breather sheet, comprising:

providing an uncured laminate formed of individual prepegs,

providing a vacuum bag,

applying a release film against the uncured laminate,

interposing a breather sheet between the vacuum bag and the release film, wherein the breather sheet is comprised of two distinct, affixed outer layers of semi-rigid material with a mesh layer interposed therebetween and incompressible across a plane of its surface such that the breather sheet as assembled is incompressible, each of the outer layers being provided with a plurality of holes prior to assembly of the breather sheet, the holes being configured and disposed such that when the two outer layers are fixed together to form the breather sheet a plurality of passageways is formed for air and/or volatiles to pass freely through the breather sheet from one outer layer to the other, the passageways being configured and disposed such that that the interposition of the mesh layer in any position or orientation relative to the outer layers does not substantially obstruct all of the passageways, and

subsequently removing the breather sheet after the uncured laminate has been cured.

17. Method according to Claim 14, wherein the holes of one of the outer layers are arranged differently from the holes in the other of the outer layers.

18. Method according to Claim 14, wherein the outer layers and mesh layer are bonded together with adhesive.

19. Method according to Claim 18, wherein the adhesive is provided at spaced local spots so as to substantially avoid blocking the passageways.

20. Method according to Claim 14, wherein at least a portion of the circumference of the breather sheet is adapted to abut another breather sheet in such a way that adjacent breather sheets can be used to form a composite breather pack.

21. Method according to Claim 14, wherein the breather sheet functions to maintain a flow path throughout the vacuum bag to a vacuum source while continuous pressure is applied during curing of the laminate.

EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APPENDIX

None.